

CLAIMS

1. A system that detects an obstruction in the path of an openable vehicle member, comprising:

a direct detector that directly detects the obstruction;
an indirect detector that indirectly detects the obstruction and outputs openable member position information to the first detector.

2. The system of claim 1, wherein the indirect detector detects a force exerted by the obstruction on the openable member.

3. The system of claim 1, wherein the direct detector comprises:
a light sensor that receives light in a vicinity of the obstruction; and
an analysis circuit that conducts an analysis of light received by the light sensor.

4. The system of claim 3, wherein the analysis circuit conducts the analysis by comparing the distribution of the light received by the light sensor to a reference distribution.

5. The system of claim 3, wherein the light sensor is a charge coupled device sensor.

6. The system of claim 1, wherein the direct detector detects the obstruction according to the position information provided by the indirect detector.

7. A method for detecting an obstruction in the path of a openable member, comprising:

indirectly detecting the obstruction by detecting a force exerted by the obstruction on the openable member using an indirect detector;

outputting openable member position information; and

directly detecting the obstruction in the path of the openable member based on the openable member position information.

8. The method of claim 7, wherein the step of directly detecting the obstruction comprises detecting a light distribution along a closing line of the openable member.

9. The method of claim 8, wherein the step of directly detecting the obstruction comprises:

comparing the light distribution along the closing line with a reference distribution; and

indicating a presence of the obstruction when the comparison step shows a variation between the light distribution and the reference distribution.

10. The method of claim 9, wherein the step of directly detecting the obstruction further comprises updating the reference distribution based on the openable member position information.

11. The method of claim 9, wherein the reference distribution is based on the openable member position information.

12. The method of claim 9, wherein the indicating step indicates the presence of the obstruction when the comparing step shows that a variation between the light distribution and the reference distribution is greater than a predetermined threshold.

13. The method of claim 12, wherein the predetermined threshold is variable based on the openable member position information.

14. An anti-trapping system for an openable vehicle member, comprising:
a drive system that controls movement of the openable vehicle member;
an indirect detector that detects a force exerted by the obstruction on the openable member; and
a direct detector comprising
a light sensor that detects a light distribution affected by the obstruction and receives openable member position information from the indirect detector, and
an analysis circuit that conducts an analysis of light received by the light sensor and outputs an interruption signal to the drive system to stop movement of the openable vehicle member if the obstruction is detected.
15. The system of claim 14, wherein the analysis circuit conducts the compares the distribution of the light received by the light sensor to a reference distribution.
16. The system of claim 14, wherein the light sensor is a charge coupled device sensor.
17. The system of claim 14, wherein the direct detector detects the obstruction according to the openable member position information provided by the indirect detector.